

1       1. A procedure for activating a membrane-electrode  
2       assembly (MEA) of an electrochemical cell operating at  
3       substantially ambient conditions, said activation procedure  
4       including the steps of:

5       a) exposing the MEA to temperatures higher than ambient  
6       temperature, and substantially simultaneously back-  
7       pressurizing gaseous reactants;

8       b) after the activation of the electrochemical cell,  
9       returning conditions of said electrochemical cell to  
10      ambient conditions; and

11      c) operating said electrochemical cell.

1       2. An electrochemical cell operating according to the  
2       procedure of claim 1, comprising a proton-exchange membrane  
3       fuel cell.

1       3. An electrochemical cell operating according to the  
2       procedure of claim 1, comprising a direct methanol fuel cell.

1       4. The electrochemical cell operating according to claim  
2       2, comprising at least one MEA composed of an ion-conducting  
3       membrane, and at least one catalyst layer bonded thereto.

1       5. The electrochemical cell operating according to claim  
2       2, comprising at least one MEA composed of an ion-conducting  
3       membrane, and two, spaced-apart catalyst layers, each being  
4       bonded on opposite sides of the membrane.

1       6. The electrochemical cell operating according to claim  
2       3, comprising at least one MEA composed of an ion-conducting  
3       membrane, and at least one catalyst layer bonded thereto.

1       7. The electrochemical cell operating according to claim  
2       3, comprising at least one MEA composed of an ion-conducting  
3       membrane, and two, spaced-apart catalyst layers, each being  
4       bonded on opposite sides of the membrane.

1           8. An electrochemical cell operating according to the  
2       procedure of claim 1, comprising membrane materials selected  
3       from a group of materials consisting of: nonfluorinated  
4       ionomers partially fluorinated ionomers, perfluorinated  
5       ionomers, sulphonated polyetheretherketone, sulphonated  
6       polysulfone, sulphonated polyphosphazene, polystyrene  
7       sulphonic acid, and acid-doped polybenzimidazole.

1           9. The electrochemical cell operating according to the  
2       procedure of claim 1, comprising a membrane containing organic  
3       or inorganic dopants.

1           10. The electrochemical cell operating according to the  
2       procedure of claim 1, comprising a membrane containing organic  
3       or inorganic fillers.

1           11. The electrochemical cell operating according to the  
2       procedure of claim 1, comprising membranes composed of mixed  
3       ionomers forming composite membranes.

1           12. The electrochemical cell operating according to the  
2       procedure of claim 1, comprising a laminated membrane.

1           13. The electrochemical cell operating according to the  
2       procedure of claim 1, comprising a membrane with a supporting  
3       template, whose pores are filled with at least one ionomer.

1           14. The activation procedure according to claim 1, where  
2       catalysts, either unsupported or supported, are used to  
3       fabricate said MEA.

1           15. The activation procedure according to claim 1,  
2       wherein the electrochemical cell operates at a temperature  
3       during activation that is higher than the temperature at which  
4       the electrochemical cell is intended to operate, but not too  
5       high that it can cause decomposition of the electrochemical  
6       cell materials or dehydration of the MEA.

1           16. The activation procedure according to claim 1, where  
2       gaseous reactants are pressurized.

1           17. The activation procedure according to claim 16,  
2       where gaseous reactants are pressurized to less than 5  
3       atmospheres.

1           18. The activation procedure according to claim 16,  
2       wherein a pressure difference between a cathode gaseous  
3       reactant and an anode gaseous reactant is less than 5  
4       atmospheres.

1           19. The activation procedure according to claim 1, where  
2       the activation procedure lasts more than approximately 5  
3       minutes.

1           20. The activation procedure according to claim 1, where  
2       the activation procedure further comprises the step of:

3           d) monitoring said electrochemical cell during the  
4       activation.

1           21. The activation procedure according to claim 1, where  
2       the humidification conditions of gaseous reactants are  
3       controlled.

1           22. The activation procedure according to claim 1, where  
2       the electrochemical cell is operated between a changing load  
3       and a constant load.

1           23. The activation procedure according to claim 1, where  
2       the electrodes contain various amounts of catalysts, ionomers,  
3       and/or water repelling agents.

1           24. The activation procedure according to claim 1, where  
2       the MEA includes catalyst-coated membrane (CCM) .

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